REMARKS

Claims 1- 5 are pending in this application. Claims 1 and 2 are amended, claims 3 and 5 are cancelled, and claims 6-11 are added herein.

Claims 1-5 stand rejected under 35 USC § 112, second paragraph, as indefinite.

Claim 1 is amended, along the lines suggested by the Examiner, to change "a lot of" to --a plurality of – and to add the step of --heat treating said aggregate to form said Nb_3Sn-based superconductive wire--.

Claim 1 is also amended to clarify that the niobium or niobium alloy filament constituting said bronze/filament aggregate is a composite filament obtained by combining niobium or a niobium alloy with a filament reinforcing material.

To address another of the noted concerns, Claim 2 is amended to clarify that the niobium alloy which may be combined with a filament reinforcing material to form a niobium alloy filament is a first niobium alloy, and, the filament reinforcing material could be composed of a second niobium alloy.

Accordingly, it is respectfully requested that the indefiniteness rejection be reconsidered and withdrawn.

Claims 1-5 stand rejected under 35 USC §102(b), as anticipated by, or alternatively under 35 USC §103(a) as obvious over, Flukiger (U.S. Patent No. 4,746,581), Yu (U.S. Patent No. 5,364,709), or Kubo et al (U.S. Patent No. 5,926,942). Claims 1-5 stand rejected under 35 USC §102(b), as anticipated by, or alternatively under 35 USC §103(a) as obvious over, Tateishi et al (IEEE) or Kondoh, et al. Claim 1 is amended to add limitations previously recited in claims 3 and 5, which have accordingly been cancelled. To the extent not addressed by amendment, the rejection

is respectfully traversed.

The manner in which the present invention distinguishes over each of the applied references is discussed in detail below.

Flukiger

As in the invention recited in present claim 1 (as amended), Flukiger discloses a process in which rods and/or wires of additive metal are introduced into a tube of Nb etc. and processed to form a superconductive wire of a compound such as Nb_3Sn which has an A-15 crystal structure. That is, in Flukiger, a plurality of composite filaments are placed in a bronze matrix. Furthermore, Flukiger obtains the composite filament by combining Nb with a filament reinforcing material, with the filament reinforcing material having a specific volume fraction within the required range. For example, if Ta is used as additive metal in Flukiger, the upper limit of the weight percentage value (50 wt%) corresponds to the volume fraction value of 0.35, which is within the recited range of 0.05 to 0.65 of present claim 1.

However, unlike in Flukiger, in the present invention the critical current property and strength are balanced. This balancing is necessary because, when the composite ratio of the filament reinforcing material is increased to suppress the deterioration against strain in the radius direction of the wire (which is a primary objective of the present invention), a decrease in the proportion of Nb in the composite filament (which contacts the bronze matrix to produce the Nb_3Sn-based superconductive compound) necessarily occurs. This in turn will lead to a lowering of the critical current property.

In order to obtain a practically sufficient critical current property, it is necessary to

optimize the volume ratio of the Nb to the bronze matrix in the composite filament and to decrease the proportion of an unnecessary bronze matrix. The optimum range is approximately 0.8 or more and 2.5 or less, as previously recited in claim 5 (now cancelled), and now recited in amended claim 1.

This optimum range is restricted to a range of Sn concentration of the bronze matrix being approximately 14 wt% or more, 30 wt% or less. In the case of the bronze matrix of 14 wt% Sn, a volume ratio of Nb to bronze matrix in the composite filament of over 2.5 will result in unnecessary bronze matrix being combined. On the other hand, if the volume ratio of Nb to bronze matrix in the composite filament is decreased to lower than 0.8, the Sn concentration of the bronze would need to be raised over 30 wt%, which will in turn result in a degradation of the ductility of the bronze matrix, making it impossible to form a superconductive wire which is suitable for a practical application of the type discussed in the present application.

In accordance with the present invention, the volume ratio of the composite filament to the bronze matrix is necessarily lower than the volume ratio of Nb to the bronze matrix. For example, if the aggregate 3' (which is shown in the embodiment of Fig. 2 and is formed by embedding one or more composite filaments in the bronze matrix) is decreased, the area-reduction process of the aggregate becomes difficult. Therefore, the volume ratio of the composite filament to the bronze matrix must be 0.3 or more (See page 9, line 6 to page 10, line 18 of the present application).

Accordingly, it is respectfully submitted that Flukiger lacks any teaching or suggestion of a composite filament with (i) a volume ratio of the niobium or niobium alloy forming the composite filament to the copper-tin-based alloy matrix of 0.8 or more

and 2.5 or less and (ii) a volume ratio of the composite filament to the copper-tin-based alloy matrix of 0.3 or more, as required be claim 1.

Yu and Kubo et al

The Yu and Kubo et al are similar to the present invention in their disclosure of a bronze matrix containing a plurality of Nb_3Sn filaments, with the bronze matrix surrounded by a diffusion barrier layer and a stabilizing material (Cu) layer, sequentially.

However, neither Yu nor Kubo et al teach or suggest the volume ratio of the composite filament to the bronze matrix or the volume ratio of Nb in the composite filament to the bronze matrix as required by amended claim 1.

Tateishi et al and Kondoh et al

Tateishi et al and Kondoh et al disclose Nb_3Sn based superconductive wires in which a plurality of Nb filaments contained in the bronze matrix are reinforced by Ta fibers. However, in the Tateishi and Kondoh, the volume fraction of Ta in the Nb/Ta composite filament is within the range of 0.67 to 0.71, i.e. outside the required range. More particularly, with the volume fraction of Ta at 0.67 to 0.7, a difference occurs in the volume ratio of Nb in the Nb/Ta composite filament to the bronze matrix. As shown in Table II of Kondoh, a critical current density (Jc, Nb) normalized by the cross sectional area of Nb becomes extremely low. Therefore, it is clear from Kondoh's own disclosure that superconductive wires formed in accordance with Kondoh's teaching lack the critical current property necessary to be of practical use.

In contrast, because the volume fraction of the reinforcing material is determined

so as to be within the appropriate range in accordance with the invention of present claim 1, such a phenomenon will not occur. Hence, superconductive wires formed using the present invention are capable of functioning differently than those formed using Tateishi and Kondoh.

Accordingly, it is respectfully submitted that each of Tateishi and Kondoh lacks any teaching or suggestion of a composite filament with (i) a volume ratio of the niobium or niobium alloy forming the composite filament to the copper-tin-based alloy matrix of 0.8 or more and 2.5 or less and (ii) a volume ratio of the composite filament to the copper-tin-based alloy matrix of 0.3 or more, as required be claim 1.

Claims 6-11 are added to recite the invention in a somewhat different manner. These claims also distinguish over the applied prior art for reasons which are believed to be clear from the above.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance and an early indication of the same is courteously solicited. The Examiner is respectfully requested to contact the undersigned by telephone at the below listed local telephone number, in order to expedite resolution of any remaining issues and further to expedite passage of the application to issue, if any further comments, questions or suggestions arise in connection with the application.

To the extent necessary, Applicants petition for an extension of time under 37 CFR § 1.136. Please charge any shortage in fees due in connection with the filing of

this paper, including extension of time fees, to the Deposit Account No. 01-2135 (Case No. 521.41464X00) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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